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Benefits of a Sleep Disorders Clinic in a Veterans Administration Medical Center

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The Sleep Disorders Clinic at the San Diego Veterans Administration Medical Center provides a diagnostic service within a public hospital. Case records of the first 117 patients receiving polysomnograms in our clinic were reviewed. Of these patients, 44 percent were found to have sleep apnea, 24 percent nocturnal myoclonus and 8 percent narcolepsy. Our experience shows that in a health maintenance organization, a sleep disorders clinic provides diagnostic information (based on a polysomnogram and a sleep history) which is very helpful in the final diagnosis of medical disorders. Very few recordings were noncontributory. In this setting, a sleep disorders clinic is justified by its rich diagnostic yield.

INCREASING NUMBERS of sleep disorders clinics are being founded as diagnostic polysomnography (sleep laboratory recording) has become a recognized clinical tool. As exemplified by members of the Association of Sleep Disorders Centers, most clinics are supported by service fees. Doubt has been raised whether polysomnography can be justified as part of accepted clinical practice.[1] The issues are in many ways similar to those posed by computed tomography—another new technical procedure which has had a notable impact on contemporary medical economics.[2]

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The potential value of polysomnography may best be evaluated in a health maintenance organization where the incentives favor limiting referrals and the number of polysomnograms done to obtain the maximum benefit from limited resources. Our Sleep Disorders Clinic is unusual in that it is not supported by service fees but receives its funding from the clinical budget of the Veterans Administration Medical Center (VAMC), in San Diego, California.

The most common complaint of patients seen at a sleep disorders clinic is insomnia, although excessive daytime somnolence is common as well. Between 10 percent and 40 percent of the population report troubles with sleep, depending on how questionnaires are phrased.[3] Recently, it has been recognized that specific physiological sleep disorders may be serious. Many of the people complaining of insomnia or of excessive fatigue

have a specific sleep disorder, such as sleep apnea, narcolepsy or nocturnal myoclonus.

Sleep apnea is a repetitive process of respiratory cessation during sleep. The sleep apnea syndrome encompasses three disorders. Obstructive sleep apnea usually involves collapse of the pharyngeal airway with partial or complete blockage of airflow. Central sleep apnea results from failure of the respiratory neurons to activate the phrenic and intercostal motor neurons that mediate respiratory movements. Mixed sleep apnea is a combination of obstructive and central apnea.[4] Apneic episodes last from 10 to 180 seconds and may occur as often as 500 to 600 times each night. Most episodes of apnea are terminated by transient arousals. In addition, episodes of hypoventilation (caused by either obstruction or by central mechanisms) may produce anoxia or arousal even when complete apnea does not occur.

Narcolepsy is characterized by sudden sleep attacks and cataplexy (sudden weakness or paralysis).[5] Persons with narcolepsy also often complain of hypnagogic hallucinations, sleep paralysis while falling asleep, automatic behaviors and disrupted nocturnal sleep.

In nocturnal myoclonus, periodic leg jerks or muscle twitches occur every 20 to 40 seconds during parts of the night. As in sleep apnea, the leg jerks are often followed by transient arousals, and, subjectively, the patient may experience both disruptions of sleep and daytime fatigue or somnolence.[6]

Only a complete sleep history and laboratory polysomnogram can help a clinician make a diagnosis and distinguish one disorder from another. To obtain maximal health benefits from limited resources, our clinic focused on patients whose complaints raised suspicion of the presence of these three specific sleep disorders.

Method

Case records of the first 170 patients contacting the Sleep Disorders Clinic were examined. Most were either self-referred or referred by one of the medical services within our VAMC, although some veterans were referred by private physicians. All patients were interviewed first. No polysomnograms were recorded for 53 patients because no recording seemed necessary after our history had been obtained, the referring physician did not desire such follow-up data or the the patient failed to keep his appointment. Data on the 117 patients who received diagnostic polysomnography are reviewed below.

TABLE 1.—*Diagnoses of 117 Patients*

Diagnosis	*No. of Patients With Presenting Complaints**			*Total Number(%)*
	DOES(%)	*DIMS(%)*	*MISC(%)*	
Sleep apnea ...	32	12	7	51(44)
Nocturnal myoclonus (without other sleep disorders)	5	6	1	12(10)
Narcolepsy	7	..	1	8(7)
Other†	11	26	9	46(39)
TOTAL	55(47)	44(38)	18(15)	117(100)

*DIMS = Disorders where difficulty initiating or maintaining sleep was the chief complaint. DOES = Disorders where excessive somnolence was the chief complaint. MISC = Miscellaneous complaints: shortness of breath or apnea (N = 6), nightmares (N = 2), falling (N = 2), depression (N = 2), leg jerks (N = 1), paralysis at sleep onset (N = 1), blackouts (N = 1), disorientation (N = 1), snoring (N = 1) and loss of erection (N = 1).

†Other diagnoses: Unknown cause (N = 12); without objective findings (N = 2); hysteria/neurosis (N = 2); organic brain disease (N = 2); Kleine-Levin syndrome (N = 1); circadian rhythm disturbance (N = 1); sleep disturbance secondary to drugs (N = 9), secondary to depression (N = 11), secondary to drugs and depression (N = 2), secondary to anxiety (N = 2), secondary to schizophrenia (N = 1) and secondary to alcohol abuse (N = 1).

Each of the 117 patients was recorded for at least one full night (N = 107) or one diagnostic afternoon nap (N = 10). During each recording, an electroencephalogram, electro-oculogram, chin electromyogram, electrocardiogram, tibialis electromyogram and respiration were monitored using standard methods. In selected cases, additional measures such as esophageal balloon pressure, pharyngeal carbon dioxide concentration and arterial oxygen were recorded.

A diagnosis of sleep apnea was based on a patient's sleep history, the number of apneic episodes (30 or more, each longer than 10 seconds), and the extent of sleep disruption detected in the polysomnograms. A diagnosis of nocturnal myoclonus was based on history and the number of disruptions of polysomnographic sleep caused by leg jerks. Narcolepsy was diagnosed based on a sleep history (especially cataplexy), REM (rapid eye movement) periods at the onset of sleep and, often, by the results of a multiple sleep latency test.[7]

Results

The patients ranged in age from 20 to 82 years (median age 52 years); 28 (23 percent) were

TABLE 2.—*Characteristics of Sleep Apnea*

Chief Compliants	*No. of Patients*	*Percent*
Excessive somnolence	32	62
Insomnia	12	24
Shortness of breath/"apnea"	5	10
Falling sensation	1	2
Excessive snoring	1	2
TOTAL	51	100
Other Symptoms		
Obesity	28	55
Snoring*	26	51
Hypertension	16	31
Shortness of breath	6	12
Depression	4	8

*Although 26 patients with sleep apnea had documentation of snoring in the medical charts, there were those where there were no bed partners to confirm or deny the snoring. We have found a higher incidence of snoring by history (79 percent) in obstructive sleep apnea patients when bed partners or medical personnel could be interviewed.

younger than 40 years, 29 (25 percent) were between 40 and 49 years, 37 (32 percent) were between 50 and 59 years and 23 (20 percent) were older than 60 years. Of the 117 patients, 108 were men, reflecting the veteran population.

Table 1 shows the relationship of the presenting complaints with the diagnoses made at the Sleep Disorders Clinic. Almost half the patients complained of excessive somnolence. The others complained of difficulty initiating or maintaining sleep or other miscellaneous problems. Of all the patients, 44 percent had some form of sleep apnea and 24 percent had nocturnal myoclonus, sometimes accompanying other conditions.

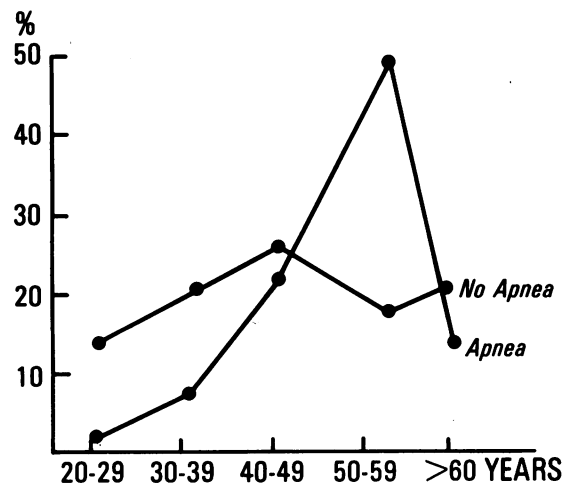

Figure 1.—Age distribution of patients with sleep apnea compared with patients without sleep apnea ($P < 0.05$).

Patients With Sleep Apnea

Of the 117 patients recorded, 51 had sleep apnea. Of these, 27 (53 percent) had obstructive sleep apnea; 10 (20 percent) had both obstructive sleep apnea and nocturnal myoclonus, 3 (6 percent) had central sleep apnea, 1 (2 percent) had central sleep apnea and narcolepsy, 1 (2 percent) had central sleep apnea and nocturnal myoclonus, 5 (10 percent) had mixed (central and obstructive) sleep apnea, 3 (6 percent) had mixed sleep apnea and nocturnal myoclonus, and 1 (2 percent) had mixed sleep apnea, nocturnal myoclonus and narcolepsy.

The chief complaints and symptoms of the 51 patients with sleep apnea are summarized in Table 2.

The age distribution of the patients with apnea was compared with that of patients without apnea. The mean age of those with apnea was 51.6 years while the mean age of those without it was 41.5 years (chi square = 16.93; $P < 0.05$; see Figure 1).

Nine patients (three with mixed sleep apnea and six with obstructive sleep apnea) were treated by tracheostomy. In eight of the nine, the symptoms largely remitted after the operation, and these patients are doing well. The ninth, in whom mixed sleep apnea was complicated by narcolepsy, gained little benefit, and the tracheostomy was allowed to close.[8]

Eight obese patients were admitted to the metabolic unit at the VAMC and were treated by a dietary regimen. Thus far, four of these have reduced their weights to within normal limits. For three of these patients, weight loss resulted in a reduced number of apneic episodes, reduced hypertension and lessened somnolence. The fourth patient still complains of somnolence and the number of apneas did not diminish after weight loss; a tracheostomy is being considered.

Two patients have been treated with imipramine. Both have improved and are doing well.

Five patients with apnea died. In each case, either the referring physicians or the patient had decided against specific treatment because of other complicating medical problems. One died suddenly in his sleep at age 47, probably from apnea. Another died suddenly in sleep but was known to suffer cardiac and renal failure. The third died at age 56, a year after apnea had been diagnosed. The cause of death was cardiorespiratory failure, possibly due to obesity. A fourth died of Hodgkin's disease at age 62, four months after obstruc-

tive apnea was diagnosed. The last patient died at age 61, two years after apnea was diagnosed. The cause of death was pneumonia.

Unfortunately, 27 patients were lost to follow-up after diagnoses and referrals were made.

Patients With Nocturnal Myoclonus

Of the 117 patients, 12 (10 percent) had uncomplicated nocturnal myoclonus. Six of these had difficulties initiating and maintaining sleep, five had disorders of excessive somnolence, and one complained of having restless legs during sleep. Three also snored, and three had depressive symptoms as well. Fifteen other patients had nocturnal myoclonus complicating sleep apnea, and one had nocturnal myoclonus in addition to narcolepsy. Combined diagnoses were made only if leg jerks were recorded at times when there were no apneic episodes.

Of the 12 patients with uncomplicated nocturnal myoclonus, 2 are receiving diazepam with symptomatic benefit. The patient with narcolepsy and nocturnal myoclonus is being treated with methylphenidate and imipramine, and both his somnolence and cataplexy are under control. Ten patients have been lost to follow-up.

Patients With Other Conditions

Based on history and polysomnograms, specific diagnoses of sleep disorders related to depression (N=13), drug and alcohol abuse (N=10), organic brain disease (N=2) and factitious complaints (N=4) were made. In some cases, these diagnoses could not have been made without data from the sleep recordings to disprove or confirm the sleep complaint.

In the cases of several additional patients, even when no new or unique diagnosis was made, the polysomnograms proved useful in documenting that an objective sleep disorder existed. For example, one patient's complaint that his back pain allowed him less than an hour's sleep nightly was documented. Such documentation also had medicolegal value or permitted staff to refuse drugs of abuse to demanding patients. Only rarely was a polysomnogram noncontributory.

Discussion

In a health maintenance organization, a sleep disorders clinic tends to discourage unnecessary referrals and limit polysomnography to those patients for whom a clinical indication is strong. In such a setting, we found that polysomnography resulted in specific diagnoses in 90 percent of the patients recorded. Of these, 43 percent had sleep apnea and 61 percent had either sleep apnea, nocturnal myoclonus or narcolepsy. Thus, in most of our cases, the Sleep Disorders Clinic contributed to the diagnosis of a specific physiological disorder.

Polysomnograms frequently led to specific medical treatments. For example, nine patients received tracheostomies in our center (some also had operations elsewhere), eight received recommendations for weight reduction and many received recommendations for taking specific medications. Several patients, particularly those with sleep apnea or narcolepsy, were relieved of partial or total occupational disabilities by specific treatments. At least seven patients who had been totally disabled were enabled to return to full-time work. At present, we cannot determine if therapy based on the Sleep Disorders Clinic examinations has resulted in prolonging life, but we are impressed that none of the patients who have followed our treatment recommendations (involving tracheostomy, weight loss, drugs and so forth) have yet died, whereas five patients with sleep apnea who did not receive specific treatments have died. Admittedly, several of the patients who died were already too ill to make treatments such as tracheostomy promising.

In addition, since the end of this survey, two additional patients have received tracheostomies, and both of them have shown improvement. Three other patients with sleep apnea underwent a successful weight reduction program. In these more recent cases, drastic improvements in reducing daytime somnolence occurred with only a minimal weight reduction of about 10 kg.

Although difficult to account exactly, the costs of our clinical work have never exceeded $30,000 a year. We feel the savings of occupational disability costs alone have more than justified this expense.

Conclusion

In our Veterans Administration setting, a sleep disorders clinic produced an extremely high yield of diagnostic information and therapeutic benefit. The percentage of patients in whom sleep apnea and nocturnal myoclonus were identified was higher in our health maintenance organization clinic than the percentage reported from fee-for-service clinics[6]; however, impressive percentages

of contributory recordings have also been described by clinics using private referral networks.[9] Our experience convinces us that sleep disorders clinics can play a worthwhile role in contemporary clinical practice.

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